Claims

1. A method of selectively combining particulate material, comprising the steps of:

(i) providing a layer of particulate material;
(ii) providing radiation over the layer of particulate material; and
(iii) varying the absorption of the provided radiation across a selected surface portion of the layer to combine a portion of the material of the layer.

2. A method according to claim 1, wherein step (iii) comprises providing a first level of radiation absorption on a first area of the selected portion and a second different level of radiation absorption on a second area of the selected portion, contiguous with the first area.

3. A method according to claim 2, wherein step (iii) comprises providing a third different level of radiation absorption on a third area of the selected portion, contiguous with the second area.

4. A method according to claim 2 or claim 3, wherein step (i) comprises providing a first particulate material in the first area and a second different particulate material in the second area of the layer.

5. A method according to claim 1, wherein step (ii) comprises providing radiation on a combination area in which particulate material is to be combined, the combination area including a centre portion and an edge portion, and step (iii) comprises providing greater radiation absorption at the edge portion than at the centre portion.

6. A method according to claim 5, wherein the absorption of the radiation increases from a minimum value at the centre portion to a maximum value at the edge portion.

7. A method according to claim 5 or claim 6, wherein step (ii) comprises providing radiation on a non-combination area contiguous with, and external to, the combination area, and step (iii) comprises varying the absorption of the provided radiation so that the absorption of the radiation over the non-combination area is less than the absorption of the radiation over the edge portion of the combination area.

8. A method according to claim 7, wherein the absorption of the radiation over the non-combination area is less than the absorption of the radiation over the centre portion of the combination area.

9. A method according to any of the preceding claims, wherein step (iii) comprises logically dividing the surface area of the selected portion into an array of segments, and providing a different level of radiation absorption on different segments in the array.

10. A method according to claim 9, wherein step (iii) comprises creating a bitmap image that divides the surface area into a plurality of segments.

11. A method according to any of the preceding claims, wherein step (iii) comprises providing variable intensity radiation over the selected surface portion of the layer to vary the radiation absorption.

12. A method according to claim 11, wherein step (iii) comprises selectively obscuring the provided radiation to vary its intensity at the surface of the layer of particulate material.

13. A method according to claim 11, further comprising providing varying amounts of radiation reflective material over the selected surface portion of the layer to vary the intensity of radiation over the selected surface portion of the layer.

14. A method according to claim 11, wherein step (iii) comprises selectively redirecting the provided radiation to vary its intensity at the surface of the layer of particulate material.

15. A method according to any of claims 1 to 10, wherein step (iii) comprises varying the radiation absorptive properties of the particulate material over the selected surface portion of the layer to vary the radiation absorption.

16. A method according to claim 15, wherein step (iii) comprises providing varying amounts of radiation absorbent material over the selected surface portion of the layer to vary the radiation absorptive properties of the particulate material over the selected surface portion of the layer.

17. A method according to claim 15 or claim 16, wherein step (iii) comprises providing radiation absorbent material for absorbing a first wavelength of radiation over a first area of the selected surface portion, and providing radiation absorbent material for absorbing a second different wavelength of radiation over a second area of the selected surface portion.

18. A method according to claim 17, wherein the method comprises providing radiation having a first wavelength over the layer of particulate material to combine the material in the first area, and providing radiation having a second wavelength over the layer of particulate material to combine the material in the second area.

19. A method according to any of the preceding claims, comprising the steps of:

(iv) providing a further layer of particulate material overlying a prior layer of particulate material including a previously combined portion of material;

(v) repeating steps (ii) and (iii) to combine a further portion of the material within the overlying further layer and to combine said

further portion with the previously combined portion of material in the prior layer.

20. A method according to claim 19, wherein steps (iv) and (v) are successively repeated to form a three dimensional object.

21. Apparatus for combining particulate material, the apparatus comprising a controller for enabling the exposure of a surface portion of a layer of particulate material to radiation, wherein the controller is arranged to control the variation of radiation absorption across said surface portion.

22. Apparatus according to claim 21, wherein the controller is responsive to temperature variation across the surface portion and is arranged to control the variation of radiation absorption in response to the temperature variation.

23. Apparatus according to claim 21 or claim 22, wherein the controller is arranged to control the variation of radiation intensity provided across said surface portion.

24. Apparatus according to claim 23, wherein the controller is arranged for selectively obscuring the radiation to vary the radiation intensity across the surface portion.

25. Apparatus according to any of claims 21 to 24, wherein the apparatus comprises an obscurer for selectively obscuring the radiation provided on the surface portion and the controller is arranged to control the obscurer for varying the radiation intensity across the surface portion.

26. Apparatus according to claim 25, wherein the obscurer comprises a radiation transmissive substrate carrying reflective material and overlying the surface portion and the controller is arranged to control deposition of the reflective material onto the substrate.

27. Apparatus according to claim 23 or claim 24, wherein the controller is arranged to control the deposition of varying amounts of reflective material directly onto the surface portion of the layer of particulate material.

28. Apparatus according to claim 23 or claim 24, wherein the controller is arranged for selectively redirecting the radiation to vary the radiation intensity across the surface portion.

29. Apparatus according to claim 28, wherein the controller is arranged to control a plurality of mirrors to selectively redirect the radiation.

30. Apparatus according to claim 21 or claim 22, wherein the controller is arranged to control the variation of radiation absorptive properties of the particulate material across said surface portion to control the variation of radiation absorption.

31. Apparatus according to claim 30, wherein the controller is arranged to control the deposition of varying amounts of radiation absorbent material directly onto the surface portion of the layer of particulate material to vary the radiation absorptive properties of the particulate material.

32. Apparatus according to claim 31, wherein the controller is arranged to control the deposition of different radiation absorbent materials capable of absorbing different wavelengths of radiation directly onto the surface portion of the layer, and to enable the exposure of the surface portion to radiation of different wavelengths.

33. A method of selectively combining particulate material substantially as hereinbefore described with reference to the accompanying drawings.

34. A method of selectively combining particulate material, comprising the steps of:

(i) providing a layer of particulate material;

(ii) providing varying amounts of radiation absorbent material over a selected surface portion of the layer of particulate material; and

(iii) providing radiation to combine a portion of the material of at least the layer of particulate material.

35. Apparatus for combining particulate material, the apparatus comprising a controller for enabling the exposure of a surface portion of a layer of particulate material to radiation, wherein the controller is arranged to control the variation of radiation absorption across said surface portion by controlling the deposition of varying amounts of radiation absorbent material over the layer of particulate material.

36. Apparatus for combining particulate material substantially as hereinbefore described with reference to the accompanying drawings.

37. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.